working hypothesis, but the experiments of Sir Dugald Clerk on the variation of specific heat, and on the composition of the mixture shortly after the attainment of maximum pressure, appear to show that the question is not quite so simple. The later development of Hopkinson's own experiments on radiation in gaseous explosions by W. T. David indicates other factors which have to be considered in framing a complete theory, and may have an important influence on the design of engines for large units of power or for high speeds. The completeness or otherwise of combustion at the moment of maximum pressure may fairly be regarded as still an open question and a fit subject for further experiment.

In developing the general thermodynamic relations between the various properties of a substance, the chief difficulty is to make a selection among the many possible permutations. It need scarcely be said that the author makes a very judicious selection for the purpose in view, and develops chiefly those relations of the energy, entropy, and total heat, and of their coefficients, the specific heats and the cooling-effects, which are required in applying the principles of thermodynamics to the correlation of the properties of the working fluids employed in heat-engines. In the next chapter he proceeds to apply the general relations to particular fluids, defined by well-known forms of characteristic equation, showing how the equation selected determines the necessary relations between the coefficients. In this connection the author discusses the general properties of gases and vapours, as illustrated by Amagat's experiments at high pressures, and Van der Waals's equation for the critical state. But most of the numerical illustrations are drawn from the properties of steam at moderate pressures, as being the most important for engineering purposes and the most accurately determined by experiment. He shows how the formulæ employed secure exact thermodynamic consistency between the various properties, but he refrains from discussing the experimental evidence with regard to the particular values selected for the constants, because this is a separate question beyond the scope of pure thermodynamics.

At the same time the book is not without some bearing on physical experiment, because no modern experimentalist can afford to represent his results by purely empirical formulæ without inquiring how far they are consistent with other measurable properties of the substance investigated. This requires a knowledge of the thermodynamical relations, and the ability to apply them, which this book is intended to teach. Thus one of the practical uses of the thermodynamic relations is to find the form and slope of lines on diagrams, such as the Mollier diagram, which are becoming so popular among engineers. Mollier had great difficulty in constructing his diagram for carbonic acid near the critical point, owing to the scarcity and uncertainty of the experimental data. Most of the missing data have since been supplied by the experiments of Prof. Frewen Jenkin and Mr. D. R. Pye, who made great use of thermodynamic relations in constructing their diagram, and incidentally showed that some of Mollier's lines were of an impossible shape. They had some difficulty, however, in fixing the form of the saturation line for the liquid, which appeared to show a point of inflexion a few degrees below the critical point. The author suggests that the point of inflexion should be at the critical point itself. This is in some ways an attractive suggestion, but the proof does not seem to be quite conclusive, and would be difficult to reconcile with the orthodox view of the critical state, according to which the critical isothermal itself possesses this property. It is possible that the singularity at the critical point may be of a nature different from that commonly assumed. It would be difficult to decide such a point by experiment, but it is just in such cases where experiment fails that thermodynamics is most useful.

H. L. C.

Forensic Medicine.

A Handbook of Medical Jurisprudence and Toxicology for the Use of Students and Practitioners. By Dr. W. A. Brend. Third edition, revised. (Griffin's Medical Pocket-book Series.) Pp. xiii+317. (London: Charles Griffin and Co., Ltd., 1919.) Price 10*s*. 6*d*. net.

THIS edition has been revised and enlarged. The chapter on the legal relationships of insanity and other abnormal states of mind, which has been entirely rewritten, gives a very good account in a brief and concise form of a branch of forensic medicine which usually presents difficulties to the medical student and practitioner. Chap. xvii., dealing with "Medical Privileges and Obligations," is excellent, and gives in a collected form the duties and responsibilities which may devolve upon a medical practitioner as a result of his registration by the General Medical Council. This subject has been much neglected in most of the existing text-books on forensic medicine, and the present edition of this work supplies a much-needed want by providing valuable advice on the line of conduct to be adopted by medical men in the many difficult situations which are likely to arise in medical practice.

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The various chapters on forensic medicine and toxicology are well written, but a few points need correction and revision in a future edition. For example, in reference to "exhumation" it is stated that disinfectants should be freely used. The use of disinfectants in exhumations should, on the contrary, always be avoided, since in suspected poisoning, which is a common reason for exhumation, the use of disinfectants is likely seriously to complicate the analysis. A classical example of this was the Crippen case, where the sprinkling of a disinfecting powder containing carbolic acid and traces of arsenic on the remains added considerably to the difficulties of the analysis.

In the chapter dealing with blood-stains reference should have been made to the benzidine test. Also sufficient importance is not attached to the serum test for human blood, which must now be regarded as being trustworthy, and one of the routine tests which should always be adopted in the examination of blood-stains in order to determine with certainty that they are those of human blood and not of other animals, such as sheep, horse, ox, etc.

We do not find any account of the influence of status lymphaticus in cases of sudden death. In the chapter on abortion there is no mention of the effect of quinine and pituitary extract, which are powerful abortifacients. Reference should have been made to the changes introduced during the war with regard to the procedure in coroners' courts. In the chapters on toxicology one would wish to have seen some description of the poisons, such as tetrachloroethane, trinitrotoluene, etc., which were responsible for so many cases of fatal jaundice amongst munition workers.

The book claims to be a handbook of medical jurisprudence, and as such it has certainly justified its publication, for it will be most useful to students for examination in forensic medicine and to medical practitioners.

Industrial Administration.

Industrial Administration: A Series of Lectures. By A. E. Berriman and Others. (Publications of the University of Manchester. No. cxxxi.) Pp. vii+203. (Manchester: At the University Press; London: Longmans, Green, and Co., 1920.) Price 7*s.* 6*d.* net.

THE lectures published in this volume were delivered in the department of industrial administration in the College of Technology, Manchester, during the session 1918–19, by various well-known authorities on subjects relating to industrial administration. Mr. Seebohm Rowntree discourses on the "Social Obligations of Industry to Labour," and endeavours to fix the minimum wage compatible with the maintenance of a working man and his family in decency and moderate comfort. In answer to the question: "Can industry afford to pay the minimum wages indicated?" he believes that the principal source to which we must look for increased wages is increased efficiency in the organisation and administration of industrial enterprises. Many British factories are run on very inefficient lines, with antiquated machinery and ill-trained staff and workers, and in such cases the profits are inconsiderable even when wages are low.

A most interesting and striking lecture on "Occupational Diseases" was given by Dr. T. M. Legge, who, in his capacity as Medical Inspector of Factories, has been largely responsible for the precautions taken to abate the evils of certain industrial processes. The success of the precautions may be judged from some of the figures he quotes. Whilst in 1900 there were 358 cases of lead poisoning among white-lead workers, and 200 among pottery workers, in 1913 the cases were reduced to 29 and 62 respectively. Of more recent interest are the cases of trinitrotoluol poisoning, which developed with alarming frequency in the latter half of 1916. There were 43 fatal cases in the six months, and another 32 fatal cases in the first six months of 1917, but by that time the chief cause of the poisoning—viz. absorption through the skin—was tracked down, and suitable precautions were taken. In the next six months fatal cases fell to 12, and in the following year to 10.

Other lectures deal with the applications of psychology to industry, industrial fatigue, and education in factory management and administration, whilst Dr. L. E. Hill gives an interesting account of his well-known investigations on "Atmospheric Conditions and Efficiency" by means of the katathermometer. Perhaps the lecture of most general interest is that on "Industrial Councils," by Mr. T. B. Johnston. The national council recently formed in the pottery industry is described in some detail, and it is to be hoped that in course of time similar councils will be formed in all the other staple industries. Equal numbers of representatives of the manufacturers and of the operatives sit on all committees, and they not only consider questions relating to wages, employment, and the conditions of production, but also encourage research into the industry, and consider inventions and improvements designed by the workpeople. Most important of all, the employers disclose full details of wages,

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